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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/066,051
Filing Date: January 31, 2002
Appellant(s): PEH ET AL.

Derek J. Westberg
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 27 October 2006 appealing from the Office action mailed 20 March 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on 3 November 2006 has been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,209,033 **Datta** 05-1997

Shahoumian et al. "Storage Area Network Fabric Design". November 8, 2000. Pages 1-8

Anil Kamath et al. "Routing and Admission Control in General Topology Network with Poisson Arrivals". Society for Industrial and Applied Mathematics, 1996. Pages 269-278.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. **Claims 1-24, 26, and 28 are rejected under 35 U.S.C. 103(a)** as being obvious over **Datta et al (US Patent No. 6,209,033)**, herein referred to as Datta, in view of **Shahoumian et al. ("Storage Area Network Fabric Design"**, November 2000), herein referred to as Shahoumian.

Regarding claim 1:

Datta discloses a computer implemented method for generating an interconnect fabric design problem specification, the problem specification including requirements for a plurality of flows among a set of network nodes **(column 6 lines 55-61)** and the problem specification suitable for application of a design technique by which physical communication links and communication devices are arranged to meet the flow requirements **(column 12 lines 47-53)**, the method comprising selecting, from among the set of network nodes, a source node and destination node **(column 2 lines 25-29)**, determining a maximum capacity available at the selected source node and the selected terminal node **(column 3 lines 1-10, 24-35)**, and generating the flow having a capacity less than or equal to the lower of the maximum capacity of the source node and the terminal node **(column 8 lines 33-61)**. Datta discloses repeating the above steps until all configurations are tested **(figure 6: steps 63 and 64 are repeated)**.

Datta fails to disclose a problem specification that requires adding more flows than there are ports to a node.

Shahoumian teaches network specifications that add more flows than there are ports to a node **(page 3 slides 5-6)**.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of Datta and Shahoumian in order to develop a design method that is not tedious, time-consuming, or error-prone **(Shahoumian: page 1 slide 6).**

Regarding claims 2 and 3:

The combination of **Datta and Shahoumian** as applied to claim 1 above teaches determining the maximum capacity of each node by considering each port, along with port saturation and unused port capacity. Datta calculates the maximum capacity of the node **(Datta: column 8 lines 61-67; column 13 lines 27-49).** Datta does not disclose examining each port individually do determine the maximum capacity, but it would have been obvious that in order to measure the capacity of a single node, the capacity of each of the ports on the node must be considered. Without measuring the capacity of the individual ports, the capacity of the whole node cannot be correctly determined.

Regarding claims 4 and 5:

The combination of **Datta and Shahoumian** as applied to claim 1 above teaches the method according to claim 1, further comprising repeating said selecting, said determining, and said generation until a stop condition is repeated **(column 3 lines 1-10).** Datta tests all the links present in the network, so the stop condition is reached when all existent connections between the source nodes and destination nodes are evaluated. The links are assigned flows according to the specified substitutions to be made **(Datta: column 6 lines 55-61).**

Regarding claim 6:

The combination of **Datta and Shahoumian** as applied to claim 5 above teaches the method according to claim 5, wherein said set of network nodes comprises a cluster of nodes and wherein the design problem includes a plurality of clusters **(Datta: column 2 lines 12-16).**

Regarding claim 7:

The combination of **Datta and Shahoumian** as applied to claim 6 above teaches the method according to claim 6, wherein the design problem includes at least one flow between a pair of clusters **(Datta: column 2 lines 12-16; Figure 8).**

Regarding claim 8

The combination of **Datta and Shahoumian** as applied to claim 7 above teaches the method according to claim 7, wherein the design problem further comprises at least one node not in the clusters having a flow to a node in the clusters **(Datta: column 2 lines 12-16; Figure 8).**

Regarding claims 9 and 10:

The combination of **Datta and Shahoumian** as applied to claim 1 above teaches the method according to claim 1, further comprising generating an additional flow and determining whether to add the flow to the design problem according to a specified probability **(Datta: column 6 lines 33-61)**. New links are added to the network, and the network is then simulated to see if the changes are preferable. If there is a high probability that the changes will negatively affect the network, or if this causes the bandwidth to exceed its maximum, the changes can be discarded.

Regarding claims 11 and 12:

The combination of **Datta and Shahoumian** as applied to claim 1 above teaches the method according to claim 1, wherein the flow is assigned to a sign port or split among multiple ports **(Datta: column 12 lines 47-56).**

Regarding claim 13.:

The combination of **Datta and Shahoumian** discloses all of the elements of the claim as discussed above in the rejection of claim 1.

Regarding claims 15 and 16:

The combination of **Datta and Shahoumian** discloses all of the elements of the claim as discussed above in the rejections of claims 2 and 3.

Regarding claims 17 and 18:

The combination of **Datta and Shahoumian** discloses all of the elements of the claim as discussed above in the rejection of claims 4 and 5.

Regarding claim 19:

The combination of **Datta and Shahoumian** as applied to claim 16 above teaches the system according to claim 16 wherein the stop condition is based on the bandwidth levels of the flow requirements **(Datta: column 13 lines 14-26).**

Regarding claims 20-24:

The combination of **Datta and Shahoumian** discloses all of the elements of the claim as discussed above in the rejections of claims 6-10.

Regarding claim 26:

The combination of **Datta and Shahoumian** as applied to claim 1 above teaches the method according to claim 1, wherein the capacity available at a node is reduced by the capacity of each flow assigned to the node **(Datta: column 8 lines 51-60).**

Regarding claim 28:

The combination of **Datta and Shahoumian** discloses all of the elements of the claim as discussed above in the rejection of claim 26.

2. **Claims 25 and 27 are rejected under 35 U.S.C. 103(a)** as being obvious over **Datta (US Patent No. 6,209,033)**, in view of **Shahoumian ("Storage Area Network Fabric Design", November 2000)**, and in further view of **Kamath et al. ("Routing and Admission Control in General Topology Networks with Poisson Arrivals)**, herein referred to as Kamath.

Regarding claims 25 and 27:

The combination of **Datta and Shahoumian fail to disclose** assigning the input and output flow for a node randomly.

Kamath teaches assigning a random flow into a source node that follows the demand and capacity requirements for the source node **(Kamath: page 275 "Theorem 3.6").**

At the time of the invention, it would have been obvious to combine the teachings of Datta, Shahoumian, and Kamath because assigning the flow randomly to a node results in a more realistic model **(Kamath: "Abstract", paragraph 3).**

(10) Response to Argument

Response to Argument – Prior Art Rejections

Appellant's arguments pertaining to the 103 rejections are not persuasive. Appellant's arguments focusing on claims 1-28 are addressed in the order in which they are presented on the Appeal Brief starting on page 14.

The main thrust of Appellant's arguments center around Datta and Shahoumian's alleged failure to teach or suggest a method for generating an interconnect design problem, the problem including requirements for a plurality of flows among a set of network nodes, nor particular steps for adding a flow to the requirements (pages 15 and 16 of the remarks). The Examiner emphasizes that the secondary reference (Shahoumian) is relied upon only for teaching adding more flows than there are ports on a node.

(10.1) Appellant argues, on page 15, that Datta does not teach a method for generating an interconnect design problem, the problem including requirements for a plurality of flows among a set of network nodes, nor particular steps for adding a flow to the requirements.

Examiner's Answer:

The Examiner notes that the term "interconnect fabric" is defined in the specification as a means for providing "communication among a set of nodes in a network" **(page 1).** The Examiner notes that communication requirements of an interconnect fabric may be characterized in terms of a set of flow requirements that specifies the required communication bandwidth from each source node to each terminal node. **(specification page 1).** The Examiner notes that the **design of an interconnect fabric** involves selecting the appropriate arrangement of physical communication links and interconnect devices and related components that will meet the flow requirements **(specification page 1).** The Examiner notes that the **design problem** may specify nodes that are to be interconnected by the design and requirements for communication flows among the specified nodes **(specification page 4).** Thus, the Examiner asserts

that it can be reasonably concluded that an "interconnection fabric design problem specification" comprises requirements for communication flow between nodes in a network of physical communication links and interconnect devices. **Datta discloses** a capacity evaluation and planning **(title)** for a network comprised of communication links and interconnect devices **(1.21-1.31).** This entails analyzing and altering the network configuration, which refers to the structure of a network's physical and virtual connections **(2.6-2.23). Datta discloses** simulated changes to the network configuration that may include **substituting simulated traffic volume amounts for selected links *(flow requirements)* (2.61-2.67).** Thus, Datta discloses analyzing the current configuration of a network, and based on the results, generating changes that will improve the performance of the network. These generated changes, which can include new or additional flow requirements, are equivalent to the design problem claimed by the Applicant.

(10.2) Appellant argues, on page 16, that Shahoumian does not teach a method for generating an interconnect design problem.

Examiner's Answer:

The Examiner emphasizes that the secondary reference (Shahoumian) is relied upon only for teaching adding more flows than there are ports on a node, and is **not relied upon** for teaching a method for generating an interconnect design problem.

(10.3) Appellant argues, on page 17, that the final rejections does not set forth a *prima facie* case for obviousness because the Office Action relies both upon passages of Datta that discuss the "prior art" with respect to Datta and upon other passages of Datta that discuss "the invention" of Datta.

Examiner's Answer:

The Examiner notes that the limitation "generating the flow having a capacity less than or equal to the lower of the maximum capacity of the source node and the terminal node" in claim 1 was mistakenly rejected using **column 6 lines 33-61** of Datta was an error. The Examiner intended to cite ***column 8*** **lines 33-61**, and apologizes for the oversight. The Examiner notes that the additional cited portion of Datta that entails a prior art discussion is used only for its disclosure of a source node and terminal node. Datta does not intend to change the discussed prior art by eliminating or altering the use of the source and destination nodes, and discloses an intent to include alternate methods of presenting the data pertaining to these nodes. Thus, Datta's invention improves on the prior art by adding additional functionality, and does not in any way change the definition or use of the source and terminal nodes. Additionally, **Datta discloses** the use of such nodes in **figure 8 (nodes) and 10 (links between nodes) and 14.**

(10.3) Appellant argues, on pages 17-18 that Datta does not disclose the limitations of claim 1 including "selecting, from among the set of network nodes, a source node and a terminal node for a flow to be added to the requirements" and "determining a maximum capacity available at the selected source node and the selected terminal node."

Examiner's Answer:

The Appellant is directed to **2.25-2.29 and figures 8 and 10** of the Datta reference for the disclosure of source and terminal nodes and links between the nodes. **Datta discloses** a capacity evaluation and planning **(title)** for a network comprised of communicated links and interconnect devices **(1.21-1.31).** This entails analyzing and altering the network configuration, which refers to the structure of a network's physical and virtual connections **(2.6-2.23). Datta discloses** simulated changes to the network configuration that may include **substituting simulated traffic volume amounts for selected links *(flow requirements)* (2.61-2.67).** Thus, Datta discloses analyzing the current configuration of a network, and

based on the results, generating changes **(which may include flow requirements)** that will improve the performance of the network. The Appellant is further directed to **7.2-7.9** of the Datta reference, which discloses that the changes made to the network may further include **adding subnets** (i.e. nodes, links, and communication policies such as amount of traffic). Thus, by adding subnets, Datta discloses adding additional communication policies **(2.6-2.19)**, which entail the amount of traffic flowing through a link **(flow requirements).**

The Appellant is further directed to **8.61-8.67**, which discloses an upper bound bandwidth **(maximum capacity)** and lower bound bandwidth for each link.

(10.4) Appellant argues, on page 19, that Datta does not disclose adding requirements for flows to the problems specifications each time a different scenario is tested.

Examiner's Answer:

Appellant is directed to **(11.45-11.48),** which discloses adding a new link **(i.e. flow requirement)** when a link is doing more than its fair share and exceeding its upper bandwidth capability. Thus, the alternate configuration **(scenario)** entails adding additional flow requirements to the specification.

(10.5) Appellant argues, on page 20, that the Office Action contains an alleged motivation for combining Datta and Shahoumian that would not have motivated a person to combine Shahoumian with Datta.

Examiner's Answer:

The Examiner notes that **Shahoumian discloses** both the generation of the problem **(page 5 3rd slide)** and finding a solution to the problem **(page 3 2nd slide)**. Shahoumian discloses that the current design methods are tedious and time-consuming **(page 1 6th slide)** and attempts to solve this by

algorithms that are fast and cost-efficient **(page 3 6th slide).** Thus, the Examiner asserts that sufficient motivation exists for combining the Datta and Shahoumian references.

(10.6) Appellant argues, on page 21, that because Datta assumes the capacity of a link can be changed, there would be no motivation to modify Datta in the manner suggested in the final rejection (i.e. examine each port individually to determine maximum capacity).

Examiner's Answer:

The Examiner notes that though Datta discloses changing the capacity of a link, **Datta further discloses** an upper-bound link bandwidth of the links that are pre-defined by a system administrator and are not altered **(8.61-67).** Thus, motivation exists for examining each port individually to determine maximum capacity because the amount of traffic flowing through a link is derived from the traffic flowing in and out of the ports on the node **(12.47-12.51).**

(10.7) Appellant argues, on page 22, that the final rejection states that Datta and Shahoumian teach the limitations of a specified degree of port saturation and used port capacity for determining maximum capacity, but does not appear to specify where they are allegedly taught.

Examiner's Answer:

The Appellant is directed again to **8.61-8.67 and 13.27-13.49** of the Datta reference (as cited in the Final Rejection). Datta calculates the maximum capacity of the node. Datta does not disclose examining each port individually do determine the maximum capacity, but it would have been obvious that in order to measure the capacity of a single node, the capacity of each of the ports on the node must be considered. Without measuring the capacity of the individual ports, the capacity of the whole node cannot be correctly determined. The Appellant is further directed to **12.47-12.51** of the Datta reference,

which discloses derived the amount of traffic through a link from the traffic flowing in and out of the ports on the node (which would account for used and unused portions of the ports).

(10.8) Appellant argues, on page 22, that since Datta does not teach the process of claims 1 and 13, Datta does not teach performing them until a stop condition is reached.

Examiner's Answer:

The Examiner asserts that Datta and Shahoumian teach the process of claims 1 and 13, as shown above, and teach performing them until a stop condition is reached **(Datta: 3.1-3.10). Datta discloses** testing all the links present in the network, so the stop condition is reached when all existent connections between the source nodes and destination nodes are evaluated, and the links are assigned flows according to the specified substitutions to be made **(6.55-6.61).**

(10.9) Appellant argues, on page 23, that Datta does not disclose cumulating of flows assigned to nodes.

Examiner's Answer:

The Appellant is directed to **7.2-7.6 and 11.45-11.28** of the Datta reference, which discloses adding **(cumulating)** flows to the design.

(10.10) Appellant argues, on page 23 that Datta does not disclose a set of network nodes comprising a cluster of nodes and a design problem including a plurality of clusters, because the cited portion of Datta refers to a network having such features, while the claims are directed to a design problem having the above-mentioned features.

Examiner's Answer:

The Examiner asserts that the changes made to the network in the Datta reference are first generated **(13.14-13.26)** and are then imposed on the network. The generation of these new flow requirements are equivalent to the problem specification.

(10.11) Appellant argues, on page 24, that Datta does not disclose a design problem including at least one flow between a pair of clusters, because the cited portion of Datta is referring to a network having such features, while Applicant's claims recite the design problem having the above-mentioned features.

Examiner's Answer:

The Examiner asserts that the changes made to the network in the Datta reference are first generated **(13.14-13.26)** and are then imposed on the network. The generation of these new flow requirements are equivalent to the problem specification. Similarly, the configuration of the network is first generated, and then the network is configured based on these generated configurations **(3.36-3.41).**

(10.12) Appellant argues, on page 24, that Datta does not disclose that at least one node not in the clusters having a flow to a node in the clusters, because the cited portion of Datta is referring to a network having such features, while Applicant's claims recite the design problem having the above-mentioned features.

Examiner's Answer:

The Examiner asserts that the changes made to the network in the Datta reference are first generated **(13.14-13.26)** and are then imposed on the network. The generation of these new flow requirements are equivalent to the problem specification. Similarly, the configuration of the network is first generated, and then the network is configured based on these generated configurations **(3.36-3.41).**

(10.13) Appellant argues, on page 25, that Datta does not disclose determining whether to add a flow to the design problem according to a specified probability.

Examiner's Answer:

The cited portion of the Datta reference **(6.33-6.61)** discloses analyzing the current configuration and modifying the configuration. **Datta discloses** details for modifying the configuration in **13.27-13.48.** Here, switch load distribution characteristics are modeled to **project the load impact** (i.e. the probability and amount that volumes would change) of changing a switch.

(10.14) Appellant argues, on page 25, that Datta does not disclose repeating the steps of generating an additional flow and determining whether to add the flow to the design problem a number of times determined from a difference between a current number of flows and a specified maximum number of flows because the flows of Datta are not cumulated.

Examiner's Answer:

The Appellant is directed to **7.2-7.6 and 11.45-11.28** of the Datta reference, which discloses adding **(cumulating)** flows to the design. Appellant is further directed to **6.33-6.61** of the Datta reference (as cited in the Final Rejection). New links are added to the network, and the network is then simulated to see if the changes are preferable. If there is a high probability that the changes will negatively affect the network, or if this causes the bandwidth to exceed its maximum, the changes can be discarded.

(10.15) Appellant argues, on page 26, that Datta does not disclose a stop condition based on the bandwidth levels of the flow requirements because the flows of Datta are not cumulated..

Examiner's Answer:

The Appellant is directed to **7.2-7.6 and 11.45-11.28** of the Datta reference, which discloses adding **(cumulating)** flows to the design. Appellant is further directed to **13.14-13.26** of the Datta reference (as cited in the Final Rejection).

(10.16) Appellant argues, on page 27, that while both the Applicants' invention and Kamath broadly relate to networks, each are directed toward totally unrelated aspects of networks, and accordingly, there would not have been motivation to combine Kamath with Datta or Shahoumian to achieve the Applicants' invention.

Examiner's Answer:

The Examiner asserts that the Applicant's invention and Kamath are both directed to the configuration of a network model, and thus sufficient motivation exists to combine Datta, Shahoumian, and Kamath.

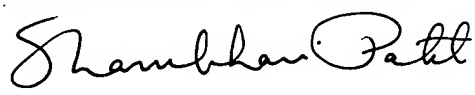
(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Shambhavi Patel, Patent Examiner



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